

REMARKS

In the Office Action dated December 18, 2001, the Examiner objects to the drawings. The Examiner also rejects claims 1-14 under 35 U.S.C. § 103(a). With this Amendment, claim 8 has been amended. Claims 15 and 16 have been added. No claims have been canceled. After entry of this Amendment, claims 1-16 are pending in the application. For the reasons set forth herein, it is respectfully submitted that the Applicants' invention is not rendered obvious by the cited combination.

The Examiner objects to the drawings under 37 C.F.R. 1.83(a), stating that the clutch must be shown or the feature canceled from the claims. Enclosed herewith is a Request for Drawing Change Approval accompanying new Figure 4, which is marked "Proposed" in red. Figure 4 is a partially fragmented view showing a vehicle 200 including an engine 202 and an electromagnetic actuator 110 coupled to a known viscous fluid clutch 112 associated with an engine cooling fan 204. It is respectfully submitted that proposed Figure 4 is supported by the Application as originally filed at page 1, lines 13-26.

With this Amendment, minor changes have been made to the specification to correct typographical errors. In addition, several changes have been made to incorporate a description of new Figure 4 into the specification. It is respectfully submitted that these changes add no new matter to the Application.

In the Office Action, the Examiner rejects claims 1-14 under 35 U.S.C. § 103(a) as being unpatentable over the acknowledged prior art in view of Brown, U.S. Patent No. 5,511,643. The Examiner states that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to place the peripheral surface of the can immediately adjacent the electrical coil in view of Brown's teaching of an electrical coil closely guarded by its can. As motivation, the Examiner cites the goal of reducing the amount of ferromagnetic material needed to construct the device. Claim 8 has been changed to conform to the language of claim 1 that clarify that said peripheral surface of said can is interposed between said electrical coil and said bearing partitioning said electrical coil inside said can and said bearing outside said can. The Examiner's rejection is respectfully traversed.

First, it is respectfully submitted that the Examiner has failed to provide proper

motivation to combine the prior art described in the Applicants' disclosure with Brown. The Applicants' teachings are directed toward the reduction of the magnetic flux flow loop, not the reduction of ferromagnetic material. There is no teaching or suggestion in the Applicants' discussion of the prior art that reduction in the amount of ferromagnetic material is desirable. Only by an impermissible comparison of the prior art and Applicants' invention can one determine that the Applicants' invention may, but not necessarily will, result in a reduction of ferromagnetic material. Nor does Brown teach or suggest that a reduction in the amount of ferromagnetic material is desirable. Brown is directed to an improved cover assembly for a viscous fluid coupling that reduces leakage between the inside diameter of the ferromagnetic flux ring 49 and the adjacent surface of the aluminum cover 11. (Brown, col. 1, ll. 58-63). Brown does not do this by reducing ferromagnetic material. In fact, Brown actually increases the amount of ferromagnetic material of an annular flux ring 49 to accomplish his purpose. More specifically, Brown teaches the addition of an extension 59 to an annular portion 51 of the ferromagnetic flux ring 49 to form a tight bond between the aluminum central portion 55 of the aluminum cover 11 and the outer surfaces 61 and 63 of the extension 59 as the central portion 55 cools and shrinks. (Brown, col. 5, ll. 23-33; col. 5, line 58-col. 6, line 9 and Fig. 2). Thus, Applicants' discussion of the prior art does not teach or suggest the desirability of reducing the amount of ferromagnetic material in an actuator, and Brown teaches away from reducing the amount of ferromagnetic material needed to construct an actuator.

Further, even if this were a motivation for combining the references, the combination still fails to teach Applicants' invention. The Examiner states that Brown teaches that the ferromagnetic can 39 is immediately adjacent the coil 45. (Brown, Fig. 1). More specifically, Brown teaches a C-shaped ferromagnetic can 39 in engagement with a ball bearing set 47, which is disposed about and in contact with the shaft member 25. (Brown, col. 4, ll. 16-23). Brown teaches that when the coil 45 is energized, the resulting flux path extends through the can 39, the ball bearing set 47, the shaft 25, the armature member 27, the flux ring 49 and back through the can 39 and the ball bearing set 47. The addition of the can taught by Brown in place of the can 26 of the prior art would not teach the feature of Applicants' independent claims 1 and 8 of the peripheral surface of the can 126 interposed between the electrical coil 124 and the

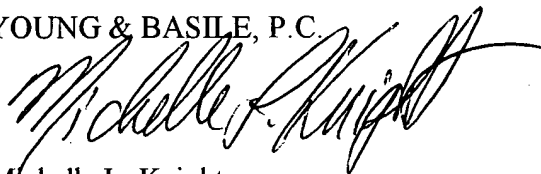
bearing 122, partitioning the coil 124 inside the can 126 and the bearing 122 outside the can 126. See Applicants' Fig. 2. Instead, the combined teachings of Brown and the prior art, motivated by the reduction of ferromagnetic material, would likely result in the can 26 extending along the edge of the electrical coil 24 to the outer surface of the bearing 22, such that the flux path 48 would extend through the bearing 22 as taught by Brown. For the foregoing reasons, it is respectfully submitted that the combination of Brown to the prior art discussed by the Applicants fails to teach or suggest the features of Applicants' independent claims 1 and 8 and their dependent claims.

With this Amendment, new claims 15 and 16 have been added. Claim 15 depends from claim 1 and describes the can as an L-shaped member. Claim 16 depends from independent claim 8 and similarly describes the can as an L-shaped member. It is respectfully submitted that, in addition to the reasons set forth with respect to claims 1 and 8 from which they respectively depend, claims 15 and 16 are not taught or suggested by the cited combination because Brown teaches a C-shaped member. Replacing the can 26 shown in Fig. 1 with the can disclosed by Brown would result in a C-shaped can, not an L-shaped can.

It is respectfully submitted that this Amendment overcomes all of the Examiner's objections and rejections to the Application as filed. It is further submitted that this Amendment has support in the application as filed, including the specification, the claims and the drawing, and that this Amendment adds no new subject matter to the application. It is respectfully submitted that this Amendment places the application in suitable condition for allowance; notice of which is requested.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

Replace the paragraph at page 2, lines 6-15, with the following paragraph:

The nut 18 [include]includes an inner peripheral surface 32, an outer peripheral surface 34, and a fastening means 36, such as a thread. The fastening means 36 is adapted to attach the actuator 10 to the clutch 12. When attached, the nut 18 spins with the clutch 12. The stainless steel bushing 20 is adapted to couple the first end portion 28 of the shaft 16 and the inner peripheral surface 32 of the nut 18. When coupled, the shaft 16, the bushing 20, and the nut 18 form a interface surface 38 which spins with the clutch 12.

Replace the paragraph at page 3, lines 16-31, with the following paragraph:

The magnetic flux flow loop 48 is illustrated in Figure 1. The magnetic flux flow loop 48 extends from the first end portion 28 of the shaft 16 through the length of the shaft 16 to the second end portion 30 of the shaft 16, from the second end portion 30 of the shaft 16 along the peripheral surface 46 of the can 26 around or outside both the bearing 22 and the electrical coil 24 to the outer peripheral surface 34 of the nut 18, from the outer peripheral surface 34 of the nut 18 through the nut 18 to the inner peripheral surface 32 of the nut 18, and between the inner peripheral surface 32 of the nut 18 and the first end portion 28 [Of]of the shaft 16 along an arch-shaped airborne path portion 50. The airborne path portion 50 of the magnetic flux flow loop 48 arches outwardly from the actuator 10 around the non-magnetic bushing 20.

Replace the paragraphs at page 5, lines 29-35, with the following paragraphs:

Figure 2 is a front perspective view of an electro-magnetic actuator in accordance with the present invention; [and]

Figure 3 is a cross-sectional side view of the electro-magnetic actuator in accordance with the present invention attached to a known type of viscous fluid clutch[.]; and

Figure 4 is a partially fragmented view of a vehicle including the electromagnetic actuator in accordance with the present invention connected to a engine cooling fan and a viscous

fluid clutch.In the claims:

8. (Amended) A combination of an electro-magnetic actuator and a viscous fluid clutch installed in a vehicle, the clutch having an armature plate for controlling fluid coupling within the clutch, the actuator comprising:

a shaft having a first end portion and a second end portion;

a nut having an inner peripheral surface and an outer peripheral surface, said inner peripheral surface coupled with said first end portion of said shaft;

a bearing disposed around said second end portion of said shaft for rotatably supporting said shaft;

an electrical coil disposed around said shaft between said nut and said bearing for receiving electrical current and producing magnetic flux; and

a ferromagnetic can disposed around said shaft having a peripheral surface extending between said shaft and said outer peripheral surface of said nut for establishing a path for magnetic flux flow there between,

said peripheral surface of said [bearing] can [interpose]interposed between said electrical coil and said bearing partitioning said electrical coil inside said can and said bearing outside said can.

Claims 15 and 16 have been added.